Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 710201N **Date: 01-12-2014**

Subject Name: Computer Algorithms

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** How is heuristic Algorithm more efficient than dynamic programming? Explain with example. **07**

(b) Solve the following recurrences using recurrence tree method. **07**
(1) T (n) = 3T (n/2) + n^2,
(2) T (n) = 4T (n/2) + n.

Q.2 **(a)** Define and prove the master theorem using proper example. **07**

(b) Outline an exhaustive search algorithm to solve the traveling salesman problem. **07**

OR

(b) Explain augmented red black tree to retrieve an element with a given rank. **07**

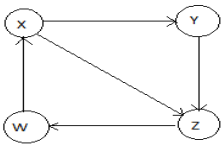
Q.3 **(a)** Using Warshall's algorithm, obtain the transitive closure of the matrix given below: **07**

$$R = \begin{Bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 \end{Bmatrix}$$

(b) Write and explain complexity of deleting and inserting an element from binomial heap? Also give the example where binomial heap is preferred than normal heap. **07**

OR

Q.3 **(a)** With the help of pseudo code, explain Marshall's Algorithm to find the transitive closure of a directed graph. Apply it to the graph shown below: **07**



(b) Define binomial heap and explain union operation on two binomial heaps. **07**

Q.4 **(a)** Create a Fibonacci-heap for following list <33,10,3,45,71,18,65,92,54,6,88,73> After creation, Decrease the key 65 to 47 and 92 to 8 show all the operations using auxiliary Array. **07**

(b) Explain Accounting method of amortized analysis. **07**

OR

Q.4 **(a)** Consider the following dimension vector of matrices and find the optimal parenthesization using dynamic programming. D = {15, 10, 5, 20, 4}. **07**

(b) Explain Potential method of amortized analysis. **07**

Q.5 **(a)** Explain merge sort in parallel environment and find its time complexity. **07**

(b) Write a note on approximation algorithms. **07**

OR

Q.5 **(a)** Explain bitonic sequence and bitonic parallel sorting network using example. **07**

(b) What is polynomially turing reducible problem? Explain with example how problem A can be polynomially Turing reduced to problem B. **07**

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